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□□□□□□□□ (JP)	**[JAPAN PATENT OFFICE (JP)]** (JP)
(12)□□□□□□	**(12)[GAZETTE CATEGORY]**
□□□□□□□□ (A)	**[PATENT GAZETTE]** (A)
(11)□□□□□□ □□□59-92940	**(11)[KOKAI NUMBER]** Unexamined Japanese Patent 59-92940
(51)□□□□□□□□3□□ C03B 37/025 //G02B 5/14	**(51)[IPC INT. CL. 3]** C03B 37/025 //G02B 5/14
□□□□□□	**[ID CODE]**
□□□□□□□□ 6602-4G L7370-2H	**[INTERNAL CONTROL NUMBER]** 6602-4G L7370-2H
(43)□□□□□ □□59□5□29□	**(43)[DATE OF FIRST PUBLICATION]** May 29, Showa 59
□□□□□□ □□□	**[REQUEST FOR EXAMINATION]** No
□□□□□□ 1	**[NUMBER OF INVENTIONS]** 1
□□□□□ 4	**[NUMBER OF PAGES]** 4
(54)□□□□□□□ □□□□□□□□□□□□□□□	**(54)[TITLE OF THE INVENTION]** Manufacturing method of optical fiber which has pore
(21)□□□□□□ □□□57□201421	**(21)[APPLICATION NUMBER]** Japanese Patent Application No. 57-201421
(22)□□□□□ □□57□□1982□11□17□	**(22)[DATE OF FILING]** November 17, Showa 57 (1982. 11.17)
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□□□□□ **[SPECIFICATION]**

□□□□□□□ **[TITLE OF THE INVENTION]**
□□□□□□□□□□□□□□□□ Manufacturing method of optical fiber which has pore

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□□□□□□□□□□□□□□□□□□ **[CLAIMS]**
□□□□□□□□□□□□□□□□□□ In manufacturing method of optical fiber which
□□□□□□□□□□□□□□□□□□ heats and carries out fiber formation of the
□□□□□□□□□□□□□□□□□□ preform by which pore was formed in along
□□□□□□□□□□□□□□□□□□ longitudinal direction, melt spinning of the
□□□□□ preform is carried out pressurizing inside of the above-mentioned pore.
Manufacturing method of optical fiber which has pore characterized by the above-mentioned.

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[DETAILED DESCRIPTION OF THE INVENTION]

This invention relates to manufacturing method of optical fiber which has pore.

Constant polarization optical fiber, image guide fiber, or multi core optical fiber is one of optical fibers which have this kind of pore.

Generally these are used for object for communication, object for measurement, or picture transmissions.

These optical fibers are manufactured by carrying out melt spinning of the base material which has pore.

However, there was often problem that pore was crushed, at the time of fiber formation.

This invention tends to solve the above-mentioned problem by pressurizing inside of pore at the time of melt spinning.

If it demonstrates referring Example which shows this to drawing, preform 1 which has pore will be attached to base-material supply apparatus 2 as shown in FIG. 1, and the tip will be inserted in heating furnace 3.

Quartz tube 4 is connected to base end part of preform 1, furthermore, pipe 5 is connected to this quartz tube 4.

And nitrogen etc. introduces 4 gases G into this pipe 5, and inside of pore of preform 1 is pressurized.

Degree of pressurization has the desirable range of 5-50 mmH_2O, and optimum value is decided from material and measurement of preform, measurement of optical fiber obtained, wire-drawing conditions, etc.

In addition, in this figure, 6 is pressure indicator, 7 is leak valve, 8 is wire-diameter measuring device for measuring wire diameter of optical fiber 9 after fiber formation, 10 is a coating device which performs coating to this fiber, 11 is a curing oven which stiffens coating layer after application, 12 is a 2nd wire-diameter measuring device which measures wire diameter of optical-fiber 9a after coated, 13 is capstan for taking over this fiber 9a, 14 is drum for rolling round this fiber 9a.

If more concrete example is described here,

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preform of 20 mm of outer diameters which has core 15, clad 16, and pore 17 formed in clad 16 as shown in FIG. 2 will be attached to device shown in FIG. 1, optical fiber of 125 micrometer of outer diameters is taken over with speed of per minute 30m, pressurizing inside of pore 17 with nitrogen of approximately 20 mmH_2O, silicone rubber was coated on this fiber, and it was considered as 350 micrometer of outer diameters, and rolled up on drum 14.

Cross-sectional shape of optical fiber obtained by carrying out like this was preform and analog which are shown in FIG. 2.

When wire drawing was performed like per preform equipped with many core 15... as shown in FIG. 3, optical fiber of preform and analog is obtained as expected.

In addition, in FIG.2 and FIG.3, the number of pores is one.

However, preform which has two or more pore can be processed similarly.

By the way, formation of pore is performed by usually machining preform.

However, with this means, since deep pore cannot be drilled, preform becomes small, therefore, optical fiber also cannot but become short.

Then, in this invention, preform which has pore without being based on machining operation is produced, wire drawing of this is carried out using device shown in FIG. 1.

FIG. 4 shows one example of this preform, it formed in core 18 and clad 19, and has symmetrical pore 20, and jacket 21 provided in periphery of clad 19 about core 18.

Clad 19 and jacket 21 do not necessarily need to be heterogeneous material here.

However, if material with very high purity is used for part which amounts to 5 or more times of core 18 diameter as clad 19, loss will become smaller.

Moreover, core 18, clad 19, and refractive index of jacket 21, core 18 is the highest, jacket 21 is the same as clad 19, or clad 19 is a little lower than jacket 21.

By the way, optical fiber which has this pore is manufactured as follows.

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That is, glass rod 25 which consists of core part 23 and clad part 24 is arranged in the center section of jacket quartz tube 22 as shown in FIG. 5, furthermore, while arranging quartz tubes 26a and 26b on the both sides, crystal rod 27 and 27... are arranged in residual space, while circumscribing these to glass rod 25, you let it inscribed in inner peripheral wall of jacket quartz tube 22.

As these materials, GeO_2-SiO_2 glass is used for core part 23, and SiO_2 glass is used for clad part 24, moreover, commercial high-purity composition quartz tube is used for quartz tubes 26a and 26b, crystal rod 27 and 27... use what is manufactured by VAD method, commercial natural quartz tube was used for jacket quartz tube 22.

Attaching complex in this way, put together to glass lathe as shown in FIG. 6, and pressurizing inside of pore of quartz tubes 26a and 26b with nitrogen, periphery of jacket quartz tube 22 is heated by acid hydrogen flame 28, and space in said quartz tube 22 is crushed.

At this time, the degree of pressurization in pore, is adjusted, as that, and it may not swell or pore may not crushed.

Wire drawing of the preform in this way, produced is attached and carried out to device shown in FIG. 1.

In addition, when carrying out collapse of the complex shown in FIG. 2, product made from alumina and carbon rod etc. are inserted into pore of quartz tubes 26a and 26b, after heating and crushing, it may make it extract rod.

As mentioned above, in this invention, melt spinning of the preform is carried out pressurizing inside of pore.

Therefore, it is not said that pore is crushed at the time of fiber formation.

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[BRIEF DESCRIPTION OF THE DRAWINGS]

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FIG. 1 is brief-display figure of device used for this invention, FIG.2 and FIG.3 is sectional drawing of preform which has pore, FIG. 4 is sectional drawing of preform obtained by this invention, FIG. 5 is a complex which is front of

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1*** preform
17, 20*** pore

□□□□□□□ **[PATENTEE/ASSIGNEE]**

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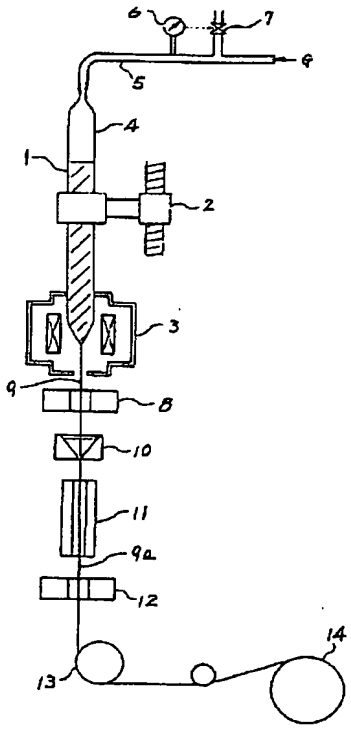
□□□ □□□ Patent attorney Makoto Ito

第 1 図



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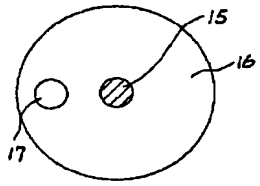

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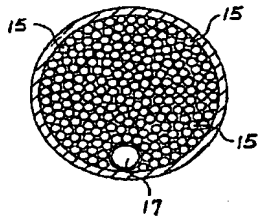
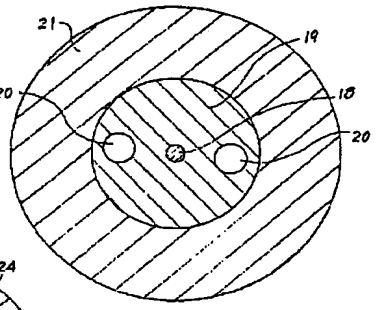


第 4 図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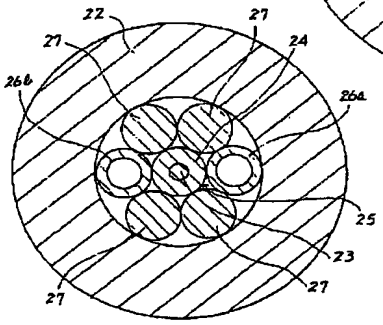
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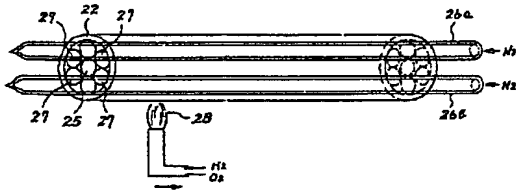
第 6 図


27
22
27
26a
H1
H2
27
25
27
28
26b
H1
O2

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